BIBLIOGRAPHIC INDEX.

I. O. F. Müller, Prodromus Zool. Dan. 1776.
II. Schrank, Fauna Boica, 1803.
III. Ehrenberg, Die Infusionsthierchen, 1838.
IV. Ehrenberg, Monatsb. Berl. Akad. 1840.
V. Dujardin, Infusoires, 1841.
VI. Ehrenberg, Monatsb. Berl. Akad. 1844.
VII. Claparède et Lachmann, Etudes sur les Infusoires et les Rhizopodes, 1858.
VIII. Stein, Der Organismus der Infusorien, 1859–67.
IX. Häckel, "Ueber einige pelagische Infusorien," Jenaische Zeitschrift, 1873.

XXII.—*On* Viquesnelia atlantica, *Morelet & Drouet.*

By Francisco d'Arruda Furtado *.

[Plate XIII.]

The history of the genus *Viquesnelia* is sufficiently well known, but may usefully be repeated here. It was founded by Deshayes, upon some fragmentary Roumelian fossils†. D'Archiac discovered another fossil representative of the genus in the Pyrenees‡. The only surviving species known are one native to India (*V. Dussumieri*, Fischer §) and a second found in the Azores; the latter is the subject of the present paper.

I have not been able to obtain Fischer's memoir on the Indian species; but the absence of any description of the animal in various conchological manuals, which at the same time make mention of the species, leads me to suppose that the detailed structure of *Viquesnelia* has not hitherto been

* Translated, with notes, by Prof. L. C. Miall.

† ["Note sur un nouveau genre de Limacien fossile," par M. Deshayes, Journal de Conchyliologie, 2e sér. tom. i. p. 283, pl. vii. figs. 14–17 (1856). The fossils in question (*V. lenticularis*, Desh.) were obtained by M. Viquesnel from rocks believed to be of the age of the Nummulitic Limestone, at Balouk-Keni, near Feredjik, Roumelia.—M.]

‡ [In a footnote to the paper cited above, Deshayes remarks that D'Archiac had found a *Viquesnelia*-stratum in the lower part of the Nummulitic deposit of the Pyrenees. This is apparently the authority for the statement in the text.—M.]

§ ["Addition à la Note sur le Genre *Viquesnelia*," Journ. de Conchyliologie, 2e sér. tom. i. p. 290. In this short memorandum Fischer explains that some shells of Limacidæ obtained at Mahé by Dussumier are preserved in the Museum at Paris, and that Valenciennes had attached to them a label bearing the name *Clypeicella Dussumieri*. The species is now included in *Viquesnelia*.—M.]

made known*. The satisfaction with which I announce new results is qualified by the unpleasant necessity of criticising somewhat harshly the previous researches of Morelet and Drouet on the same subject. It is much to be regretted that these two naturalists, skilled observers and careful writers on other subjects, should have passed by the internal structure of an animal which is, to use their own language, "sans contredit le plus curieux de tous les mollusques Açoréens"†.

MM. Morelet and Drouet examined the animal of *V. atlantica* without dissection. M. Morelet says:—"Malheureusement, dans le cours du voyage, le petit nombre de spécimens que nous avions recueillis s'est égaré, en sorte que je ne puis rien ajouter à la description des formes extérieures que j'ai donnée plus haut." Only the shell M. Morelet, like a true conchologist, took care not to lose; and this he describes minutely; the animal itself, though we are told that the specimens were lost on the voyage, is drawn by Lackerbauer as if from nature ("*ad nat.*")!

The descriptions of MM. Morelet‡ and Drouet§ differ notably, which is the more to be wondered at, as these authors conjointly founded the species, and as the memoir of M. Drouet, though later in the date of its publication, was based upon no additional materials: no second visit to the islands had been made; and the specimens collected during the first visit had, as we are told, been lost. M. Drouet's description comes nearest to nature; the figure is inaccurate and sketchy. Generic and specific descriptions based upon dissections are now offered to zoologists.

Fam. **Limacidæ**, Gray.

Gen. VIQUESNELIA, Desh.

Mantle large, submedian. *Tail* much compressed. *Respiratory orifice* on the right side, towards the hinder end of the mantle. *Caudal mucus-gland* absent. *Mandible* without ridges or teeth, its free edge forming a reentrant right angle. *Radula* very complicated. *Reproductive orifice* below and a

* [Stabile (Moll. terr. du Piémont, p. 121) has proposed to remove *V. atlantica* to a new genus *Plutonia*, and this without any knowledge of the anatomy of the animal.—M.]

† [*V. atlantica* is noticed as the most remarkable Gasteropod of the Azores in Dr. H. B. Tristram's observations on the Terrestrial Mollusks of the Azores, contributed to F. D. C. Godman's 'Natural History of the Azores,' p. 107, London, 1870.—M.]

‡ [L'Histoire naturelle des Açores, suivie d'une description des Mollusques terrestres de cet Archipel: Paris, 1860.—M.]

§ [Elémens de la Faune Açoréenne: 1861.—M.]

little behind the right upper tentacle. *Capreolus*? *Flagellum* absent. *Dart-sac* absent. *Accessory glands* represented by a glandular layer surrounding the vagina. *Spermatheca* present. *Shell* rudimentary, concealed within the mantle, oval, depressed, with a rudimentary spire.

Viquesnelia atlantica, Mor. & Dr.

Viquesnelia atlantica, Mor. & Dr., Hist. Nat. des Açores, 1860, p. 139, pl. i. fig. 1.

Animal 25 millims. (1 inch) long, 3 millims. ($\frac{1}{8}$ inch) wide, elongate, compressed behind, narrowed towards the middle behind the mantle, tuberculo-rugose, chocolate-coloured to a greater or less degree in different individuals. *Mantle* entire, defining by its posterior border the posterior two fifths of the body, and almost as long as the tail when the animal is fully extended, rounded in front, gibbous over the shell (the place of which is indicated by a reddish patch), finely shagreened, in some individuals with large blotches of bluish colour. *Neck* about one fifth of the total length, thick, rounded, slightly curved longitudinally, narrowed in front, not exceeded by the foot, with large tubercles and two longitudinal furrows which extend to the bases of the tentacles; external to these grooves are two rows of large quadrilateral oblong tubercles; colour dull reddish, deeper on the sides, where it agrees with the ground-colour of the animal, brighter and pinkish above, with large yellow blotches along the upper part of each side. *Locomotor surface* narrow, parallel-sided, with two grooves, of a general bistre or sepia-colour, with minute dark spots, glistening. *Tail* much compressed, tolerably elevated, with oblique grooves intersecting so as to form polygonal lozenge-shaped or hexagonal areas which are raised and resemble plates; each plate has very many black shining elevations, which, when examined by a powerful lens, are seen to be small hemispheres sharply defined and resembling the eyes of a spider. At times the animal, when beginning to creep, raises the tail considerably in a peculiar way. *Tentacles*—the upper ones wide apart at the base, strongly divergent, two thirds the length of the neck, cylindrical but insensibly tapering, with a shagreen-like surface, deeply coloured, nearly opaque; terminal tubercles inconspicuous, obliquely truncate above; eyes very inconspicuous, black; the lower tentacles one quarter the length of the superior, brighter-coloured, much less divergent. *Head* with anterior surface subvertical, rounded, furnished with large tubercles.

Digestive System.—*Buccal pouch* very long (as long as the stomach), pyriform-elongate, muscular layer well defined. *Mouth* hardly conspicuous, resembling when closed the letter T rather than the letter Y. *Mandible* with a cutting-edge forming a (reentrant) right angle, the attached border uniformly convex, translucent, yellowish, lateral tips sharp, with no ridges or teeth, but with visible lines of growth. *Tongue* strong, pointed, deeply concave, its sheath very prominent, straight, club-like, inclined downwards. *Radula* of strong conical or slightly depressed teeth in fifty transverse rows, each with about thirty teeth, forming chevrons which point backwards. *Œsophagus* about one third of the length of the stomach, gradually increasing in diameter backwards. *Stomach* curved, fusiform, twice as wide as the œsophagus, yellow, very pale in some individuals, with whitish longitudinal lines, which indicate internal rugosities. *Intestine* forming about half the length of the alimentary canal, equal in diameter to the œsophagus, whitish and partly transparent; its course simple, describing a letter N, nearly all of which lies in one transverse plane. *Salivary glands* largely developed, lying upon the anterior fourth of the stomach, quite separate from each other, white, lobed. *Liver* very large, bilobed, the larger lobe to the left, the anterior end curved round the central part of the stomach, the posterior end curved round the hermaphrodite gland; the smaller lobe applied to the hinder part of the intestine, sending a process into each bend, the posterior extremity lying along the rectum. The lobulation of the liver is conspicuous upon its lower surface; the colour uniform, bright and essentially composed of yellow and pink. The liver adheres strongly to the base of the stomach, and to the first part of the intestine.

Reproductive System.—*Hermaphrodite gland* very large, pyriform, of from five to six lobes, each of which consists of from ten to fifteen lobules; colour milky. The gland lies in the concavity formed by the curved posterior extremity of the larger lobe of the liver, and is partly enclosed by the small lobe. It adheres slightly to the liver, but is entirely free in some individuals. *Duct of hermaphrodite gland* large, twice as long as the gland, more or less sinuous, of uniform diameter. *Albuminiparous gland* unequally bilobed, convex posteriorly, excavated in front and receiving the duct of the hermaphrodite gland, subdivided into irregular lobules, position transverse. *Oviduct*—prostatic portion wide, sinuous, white, translucent, the dilated part remote from the albuminiparous gland, origin from gland not terminal; infraprostatic portion much curved, constituting nearly half the oviduct. *Spermatheca* spherical,

attached to the anterior end of the uterus, its canal attached (externally) to the oviduct. *Vestibule* as long as the oviduct (neglecting the convolutions of the latter), variously curved or reduplicate. *Penis* short, depressed, situate in the middle of the vestibule, bifid, of a delicate yellow-pink colour; vas deferens entering the anterior lobe*.

Shell.—I have nothing to add to M. Morelet's description, which is as follows:—"T. ancyliformis, oblonga, planata, rugosiuscula, longitudinaliter costulata, fulvescens; spira brevis, lateralis, postica, apice albido."

Note.—I have not found *Viquesnelia atlantica* in the gardens of Ponta Delgarda, where it was discovered by MM. Morelet and Drouet. The specimens upon which this memoir is founded were caught on Oct. 31, 1880, on the mountains near 7 Cidades, near the aqueducts of Muro do Carvão and Muro das 9 Janellas, on stones and overturned masses of *Sphagnum*. Specimens collected in the same neighbourhood in the month of May had the albuminiparous gland so slightly developed that it was necessary, in order to complete the study of the reproductive organs, to wait for the breeding-season; in May the spermatheca was so small as to escape observation.

EXPLANATION OF PLATE XIII.

Viquesnelia atlantica.

Figs. 1, 2. Animal (nat. size).
Fig. 3. Occasional attitude when beginning to creep.
Fig. 4. Tail-end (magnified).

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* [It will be seen from M. Furtado's description that *Viquesnelia* is similar in anatomical structure to *Limax* and the allied genera. The mandible connects it with *Vitrina*, *Hyalina*, and *Limax*; and it would go with those genera into Mörch's "Oxygnatha" ("maxilla lævis, acie simplici"). It can hardly be doubted, however, that too much stress has been laid upon characters taken from the mandible. This is incidentally shown by M. Furtado in a paper entitled "Indagações sobre a complicação das Maxillas da alguns Helices naturalisados nos Açores" (Lisbon, 1880), in which he shows that in Azorean examples of *Helix pisana*, *lactea*, and *aspersa* the mandible is singularly variable and often differs conspicuously from Moquin-Tandon's description of the same organ in European specimens of what are believed to be the same species. The lingual ribbon seems to connect *Viquesnelia* with *Testacella*, to which it is otherwise only remotely allied. It is hardly possible at present to discuss the exact place of *Vitrina* and *Viquesnelia* in the long chain of genera and subgenera which intervenes between *Limax* and *Helix*, though they seem to approach the first genus rather than the second. Much anatomical research is required to define these forms and discover their mutual relations; and M. Furtado's paper is a welcome addition to the materials already collected.—M.]

Fig. 5. Median part of radula (magnified).
Fig. 6. Lateral part of radula.
Fig. 7. Marginal part of radula.
Fig. 8. Mandible (magnified).
Fig. 9. Reproductive organs. *hg*, hermaphrodite gland; *c*, its efferent duct; *alb*, albuminiferous gland; *od*, oviduct (prostatic portion); *od'*, oviduct (infraprostatic portion); *sp*, spermatheca; *vd*, vas deferens; *pe*, penis; *v*, vestibule.
Figs. 10, 11. Shell (magnified).

XXIII.—*Relation of Devonian Insects to Later and Existing Types.* By Samuel H. Scudder*.

It only remains to sum up the results of this reexamination of the Devonian insects, and especially to discuss their relation to later or now existing types. This may best be done by a separate consideration of the following points:—

1. There is nothing in the structure of these earliest-known insects to interfere with a former conclusion † that *the general type of wing-structure has remained unaltered from the earliest times.* Three of these six insects (*Gerephemera*, *Homothetus*, and *Xenoneura*) have been shown to possess a very peculiar neuration, dissimilar to both Carboniferous and modern types. As will also be shown under the tenth head, the dissimilarity of structure of all the Devonian insects is much greater than would be anticipated; yet all the features of neuration can be brought into perfect harmony with the system laid down by Heer.

2. *These earliest insects were Hexapods*, and, as far as the record goes, preceded in time both Arachnids and Myriopods. This is shown only by the wings, which in all known insects belong only to Hexapods, and in the nature of things prove the earlier apparition of that group. This, however, is so improbable on any hypothesis, that we must conclude the record to be defective.

3. *They were all lower Heterometabola.* As wings are the only parts preserved, we cannot tell from the remains themselves whether they belong to sucking or to biting insects; for, as was shown in the essay already referred to, this point must be considered undetermined concerning many of the older insects until more complete remains are discovered.

* From the 'American Journal of Science,' Feb. 1881.
This summary of results is the conclusion of a memoir by Mr. Scudder "On the Devonian Insects of New Brunswick," published in the 'Anniversary Memoirs of the Boston Society of Natural History,' 1880.

† "The Early Types of Insects," Mem. Bost. Soc. Nat. Hist. iii. p. 21.